

Clean Version

Amended Drawings

Forward to: Official Draftsperson

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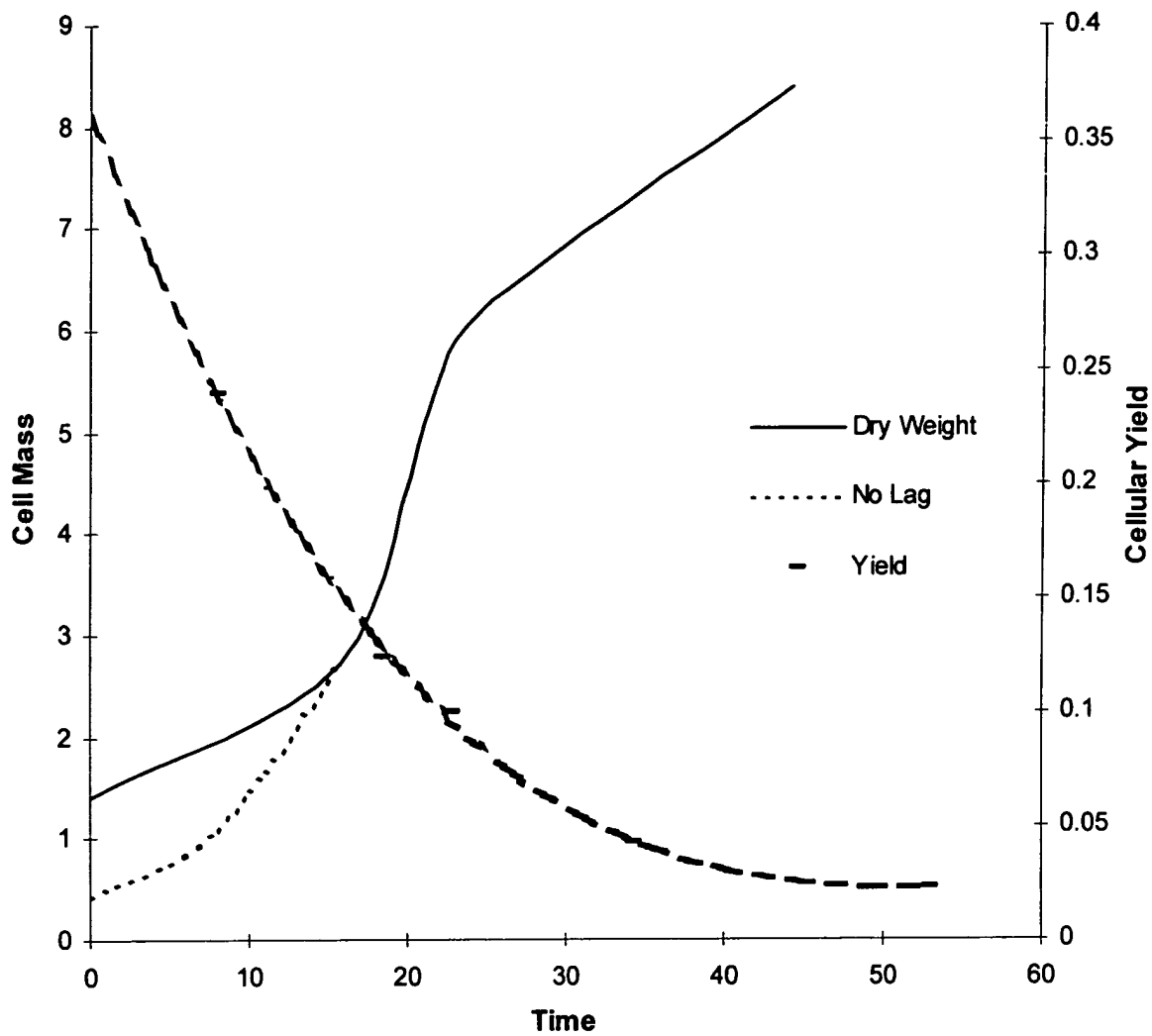


FIG.1

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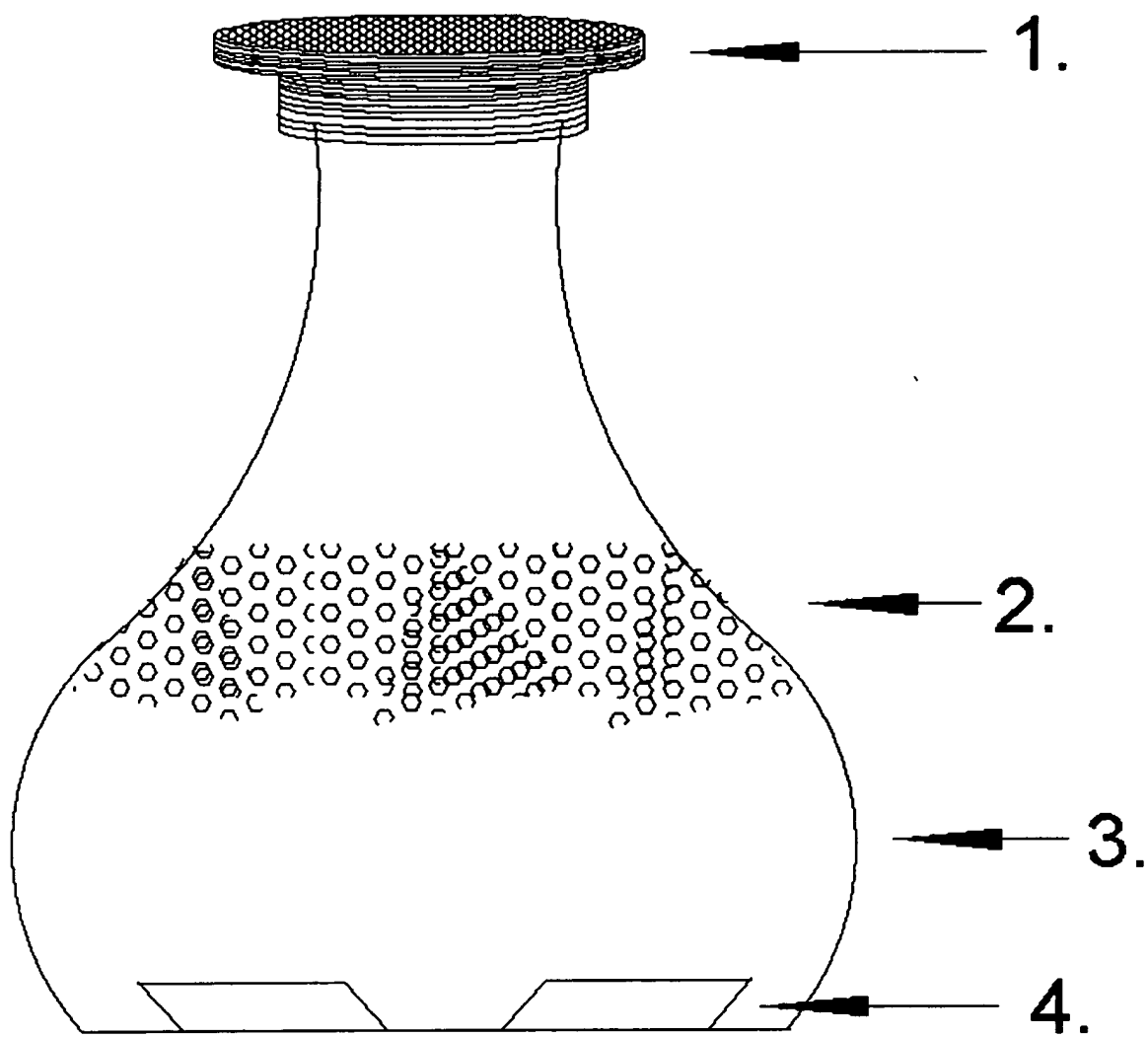


FIG.2

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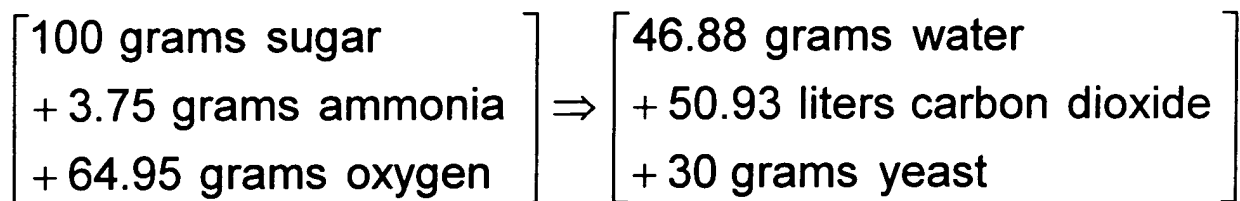


FIG.3

Time During Fermentation	Yield (g cells/g sugar)	Ammonia Needed (grams)	Water Produced (grams)	CO <sub>2</sub> Produced (liters)	Yeast Produced (C <sub>6</sub> H <sub>10</sub> O <sub>3</sub> N) (grams dry wt.)	Ethanol Produced (C <sub>2</sub> H <sub>6</sub> O) (grams)*
1st 3rd	.15	18.70	5.1	22.51	15.04	41.19
2nd 3rd	.052	.65	1.79	25.54	5.20	47.68
3rd 3rd	.023	.29	.79	26.44	2.30	49.61
Overall	.05	.626	1.72	25.60	5.00	48.52

FIG.4

$$\text{CO}_2 \text{ solubility (in l CO}_2\text{/l H}_2\text{O)} = -1.06556266071 \times \ln(^{\circ}\text{F}) + 5.38424482284$$

FIG.5

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$$\frac{\text{Change in yeast mass}}{\text{Change in time}} = \frac{\Delta X}{\Delta t} = \mu \times X$$

$$\ln \left[ \frac{X}{X^0} \right] = \mu \times (t - t_{\text{lag}})$$

FIG.6

$$t_d = \frac{\ln(2)}{\mu}$$

FIG.7

$$\text{Ratio} \left[ \frac{\text{ICO}_2}{\text{g sugar}} \right] = 0.271599039164 - (0.310674946821 \times \text{Yield})$$

FIG.8

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$$\text{Specific Gravity} = \\ (3.65201035996 \times 10^{-4}) \times S + 0.999953627005$$

FIG.9

$$Y = \frac{\Delta X}{\Delta S}$$

FIG.10

$$\left[ \frac{\Delta X \text{ (for decay)}}{\Delta time} \right] = b \times X$$

FIG.11

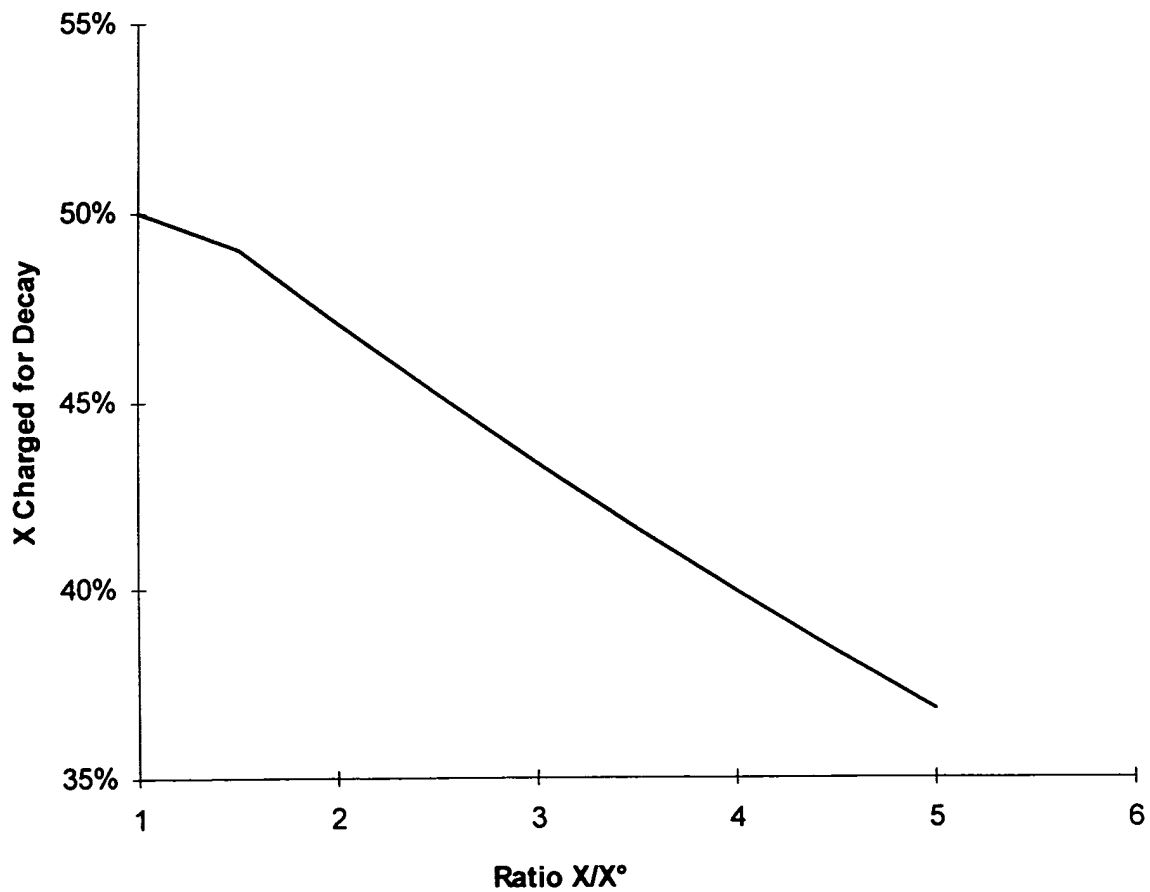
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$$Y = \left[ \frac{\Delta X}{\Delta S} \right] = \left[ \frac{5.14794}{24.644} \right] = 0.20889 \frac{gX}{gS}$$

FIG.12



$$X_{\text{chrgd}} = 0.504076447609 \times \text{EXP}(-0.0816252748703 \times \text{Ratio})$$

FIG.13

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Sample Name	Time (hours)	X weight (grams)	S.G. Reading (g S/l, see EQSG)	Measured CO2 Flow (ml / min)
$t_0$	0	1.415	183.59	0
$t_1$	15.75	2.73	178.11	3.944
$t_2$	21.03	5.1	158.94	12.344
$t_3$	24.5	6.18	147.99	15.074
$t_4$	44.08	8.38	95.965	7.234

FIG.14

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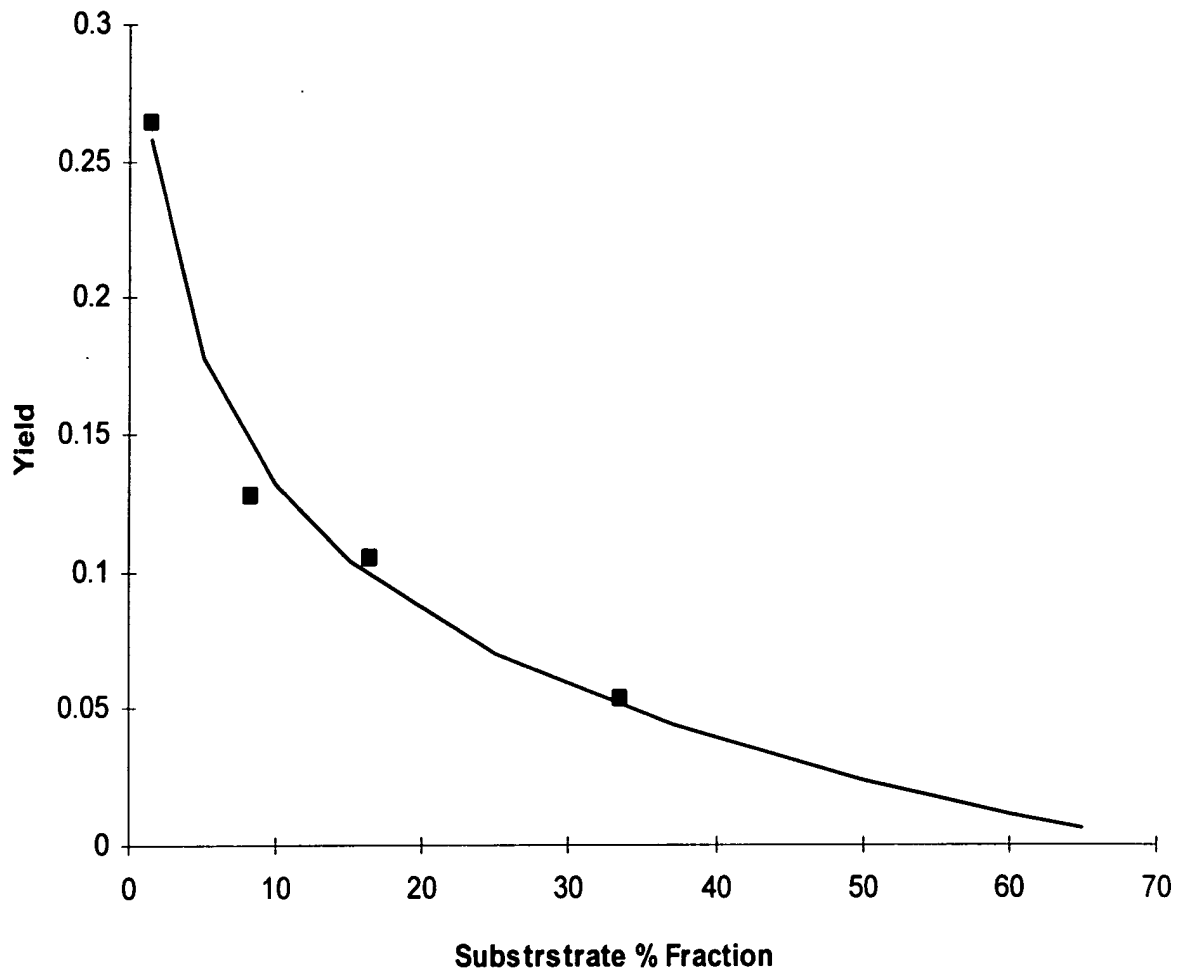


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A Interval	B Observed New X	C Total hours of interval	D Mass lost from starting X decay
$t_0 - t_1$	1.315	15.75	0.089145
$t_1 - t_2$	2.37	5.28	0.0576576
$t_2 - t_3$	1.08	3.2	0.06528
$t_3 - t_4$	2.2	19.58	0.4840176
A Interval	E Sub-total new mass (B + D)	F Ratio new X/Start X (Starting X + E) / Starting X	G Charge what new mass b? (EQXchrgd)
$t_0 - t_1$	1.404145	1.9923	0.471
$t_1 - t_2$	2.4276576	1.88925	0.475
$t_2 - t_3$	1.14528	1.22457	0.5
$t_3 - t_4$	2.6840176	1.434307	0.493
A Interval	H Decay of new mass (E x G x C x .004)	I Total new mass yield (E + H)	Amount of sugar used (g/l)
$t_0 - t_1$	0.0416652	1.4458102	5.48
$t_1 - t_2$	0.024354261	2.45201186	19.17
$t_2 - t_3$	0.007329792	1.152609792	10.95
$t_3 - t_4$	0.103634643	2.7876522	52.025
A Interval	J Average % S consumed	K Yield g X / g S	L Yield (fm curve) g X / g S
$t_0 - t_1$	1.4925	0.263833977	0.258098264
$t_1 - t_2$	8.206	0.127908809	0.144275124
$t_2 - t_3$	16.409	0.105261168	0.097997972
$t_3 - t_4$	33.56	0.053582936	0.05021553
A Interval	M % of actual Yield		
$t_0 - t_1$	97.83%		
$t_1 - t_2$	112.80%		
$t_2 - t_3$	93.10%		
$t_3 - t_4$	93.72%		

FIG.15

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$$Y = \left\{ -6.67814305038 \times 10^{-2} \times [\ln(\% \text{used})] \right\} + 0.28484105276$$

FIG.16

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Interval	% fraction of S	Yield fm EQ%used	Ratio fm EQYld (l CO <sub>2</sub> /g X)
t <sub>0</sub> - t <sub>1</sub>	1.4925	0.2580973	0.79324921
t <sub>1</sub> - t <sub>2</sub>	8.206	0.14427497	1.52663404
t <sub>2</sub> - t <sub>3</sub>	16.409	0.097998	2.3594534
t <sub>3</sub> - t <sub>4</sub>	33.56	0.0502161	5.00801093
Interval	Total new X (grams)	liters CO <sub>2</sub> predicted fm model (g X x Ratio)	liters CO <sub>2</sub> predicted by actual Yield
t <sub>0</sub> - t <sub>1</sub>	1.445803	1.1469	1.1192
t <sub>1</sub> - t <sub>2</sub>	2.452006	3.7433	4.2872
t <sub>2</sub> - t <sub>3</sub>	1.1526299	2.71968	2.5095
t <sub>3</sub> - t <sub>4</sub>	2.787623	13.9604	12.9849
Interval	Average measured CO <sub>2</sub> (ml / min)	liters CO <sub>2</sub> predicted fm avg of measured CO <sub>2</sub> flow rate at this interval	
t <sub>0</sub> - t <sub>1</sub>	1.972	1.8635	
t <sub>1</sub> - t <sub>2</sub>	8.144	2.58	
t <sub>2</sub> - t <sub>3</sub>	13.709	2.6321	
t <sub>3</sub> - t <sub>4</sub>	11.154	13.1037	

FIG.17